**TOSS-UP**

CHEMISTRY *Short Answer* Which of the following three choices is not true regarding nuclear magnetic resonance of alkenes?

1. Pi electrons exert a strong deshielding effect on alkenyl hydrogens because external magnetic fields induce pi electrons to move in a circular motion, reinforcing the external field
2. The electron-withdrawing nature of sp2 hybridized carbon is the primary reason why deshielding is highly pronounced in alkenyl hydrogens
3. Coupling between hydogens that are farther than two intervening atoms apart can be discounted.

ANSWER: 2, 3.

**TOSS-UP**

CHEMISTRY *Short Answer* List which of the following four intermolecular forces would be represented within the lattice of NaCH3COO.

1. Ionic
2. Coulombic
3. London Dispersion forces
4. Covalent

ANSWER: 1, 2

**TOSS-UP**

CHEMISTRY *Multiple Choice* In an x-ray diffraction test, a chemist fires an x-ray with wavelength 190 picometers at a crystal lattice. If he figures out that the angle where constructive interference occurs is 60 degrees, what is the distance between two layers of the lattice?

W) 80 picometers

X) 110 picometers

Y) 140 picometers

Z) 170 picometers

ANSWER: X) 110 picometers

**TOSS-UP**

CHEMISTRY *Short Answer* Examples of elements that have lattice structures with this kind of packing are manganese and zinc. This has packing layers of ABABAB…, and has a coordination number of 12.

ANSWER: Hexagonal close-packed structure

**TOSS-UP**

CHEMISTRY *Multiple Choice* Which of the following is true regarding SN1 Reactions?

W) The rate determining step is given by the step where a haloalkene disassociates into a alkyl cation and bromide

X) tertiary iodoalkanes are less soluble than corresponding bromides

Y) The rate of a SN1 reaction increases if the solvent’s polarity increases

Z) SN1 reactions are accelerated in polar aprotic solvents

ANSWER: Y) The rate of a SN1 reaction increases if the solvent’s polarity increases

**TOSS-UP**

CHEMISTRY *Short Answer* Give the formula or name for the conjugate acids of the following base.

1. Propanone

ANSWER: (CH3)2C=OH

**TOSS-UP**

CHEMISTRY *Multiple Choice* The methyl group in the molecule 3-methylpentane would be an example of an

W) primary carbon

X) secondary carbon

Y) tertiary carbon

Z) quaternary carbon

ANSWER: W) primary carbon

**TOSS-UP**

CHEMISTRY *Short Answer* This is the change in energy in a molecule resulting from bond rotation. When the value of this increases, the structure rotates from a staggered conformation to an eclipsed conformation. During this process the central C-C bond weakens, and the potential energy rises.

ANSWER: Rotational energy OR Torsional Energy OR Torsional Strain

**TOSS-UP**

CHEMISTRY *Short Answer* Rank the rates of effusion of the following four gases in order of greatest to least rate of effusion.

1. Neon
2. Fluorine
3. Oxygen
4. Helium

ANSWER: Helium, Neon, Oxygen, Fluorine

**TOSS-UP**

CHEMISTRY *Short Answer* How many joules of energy must be added into 250 grams of water in order to raise its temperature from 0 degrees Celsius to 15 degrees Celsius? Give your answer to 2 significant figures.

ANSWER: 15000 Joules

**TOSS-UP**

CHEMISTRY *Multiple Choice* Steel is

W) an interstitial alloy, because the atomic radii difference between iron and carbon is small

X) a substitutional alloy, because the atomic radii difference between iron and carbon is small

Y) a substitutional alloy because the atomic radii difference between carbon and iron is large

Z) an interstitial alloy, because the atomic radii difference between iron and carbon is large

ANSWER: Z) an interstitial alloy, because the atomic radii difference between iron and carbon is large

**TOSS-UP**

CHEMISTRY *Short Answer* This phase of liquid crystal is distinguishable from other types of liquid crystals because its molecules line up in orderly lines and lie on top of each other in neat layers.

ANSWER: Smectic Phase

**TOSS-UP**

CHEMISTRY *Short Answer* This law enables scientists to find the delta H of any reaction, even if it is impossible to carry out. It states that the enthalpy change of the process is the sum of the enthalpy changes of its individual steps.

ANSWER: Hess’s Law of Heat Summation

**TOSS-UP**

CHEMSITRY *Short Answer* Give the electron hybridization at the central atom and VSEPR shape in the molecule IOF5.

ANSWER: Octahedral, sp3d2

**TOSS-UP**

CHEMISTRY *Multiple Choice* Which of the following statements is false regarding p-n semiconductors?

W) If the terminals of a p-n junction are reversed, no current can flow

X) When silicon is doped with phosphorus, a p type semiconductor forms

Y) p-n junctions can act as rectifiers, and can convert current to direct current

Z) p-n junctions placed next to each other over and over again can create a transistor

ANSWER: X) When silicon is doped with phosphorus, a p type semiconductor forms

**TOSS-UP**

CHEMISTRY *Short Answer* Which of the following three statements is false concerning the colligative properties of molecules?

1. The vapor pressure of a solvent is directly proportional to the mole fraction of solvent in the solution.
2. The osmotic pressure is proportional to the molality of the solute particles
3. All solutions will boil at a higher temperature than the pure solvent.

ANSWER: 2 only

**TOSS-UP**

CHEMISTRY *Short Answer* Name which of the following three statements is or are true about catalysts.

1. Catalysts only speed up the forward reaction, hence, producing the reactants quicker
2. Catalysts lower the activation energy by providing an alternate energy pathway
3. In general, all catalysts make the rate constant larger.

ANSWER: 2,3

**TOSS-UP**

CHEMISTRY *Short Answer* Given the general equation 2A+ 3B -> C+ 4 D, give the reaction quotient.

ANSWER: [(C)(D)4]/ [(A)2(B)3]

**TOSS-UP**

CHEMISTRY *Short Answer* In the graph of a weak acid-strong base titration curve, which of the following four statements would you expect to observe?

1. A gradually rising section of the curve will appear before the sharp rise to the equivalence point.
2. The initial pH of the curve will be higher than that of a strong acid-strong base titration curve.
3. To determine when the equivalence point has been reached, phenolphthalein would be a logical choice for a buffer.
4. Beyond the equivalence point, the graph have symmetry to the portion of the graph before the equivalence point.

ANSWER: 1,2,3